REMARKS

Review and reconsideration on the merits are requested.

Claims 35 and 36 were rejected under 35 U.S.C. § 112, second paragraph. Particularly, the Examiner considered that claim 35 does not further limit the structure of claim 34 from which it depends. Also, the Examiner considered the language "sequentially arranged in layers" as set forth in claim 36 to be vague.

In response, claim 35 has been amended to recite that a pump current of less than 10 microamperes flows between the first and second electrodes when an electric potential in the range of 0.2 V to less than 0.5 V is applied across the first and second electrodes. This current value includes an offset current which varies depending on the structure of the sensor, and specifically the electrode area ratio. See, for example, Fig. 5, showing current data for an applied voltage of 0.7 V and 1.8 V. Thus, amended claim 35 further limits the structure of claim 34, in that not all structures falling within the scope of claim 34 would necessarily have an offset current of less than 10 microamperes.

Claim 36 has been amended to recite that the first oxygen iron pump cell, oxygen-concentration measuring cell and second oxygen ion pump cell are sequentially arranged [in layers] over each other as suggested by the Examiner.

In view of the above amendments, it is respectfully submitted that the claims fully comply with 35 U.S.C. § 112, and withdrawal of the foregoing rejection is respectfully requested.

Claim 33 has been amended to correct an inadvertent clerical error in transferring the claim. See the Amendment under 37 C.F.R. § 1.116 filed October 19, 2001.

Claims 16-20, 22-24 and 30-35 were rejected under 35 U.S.C. § 102(a) as being anticipated by U.S. Patent 5,672,811 to Kato et al. The grounds for rejection remain the same as set forth in the previous Office Action. Particularly, the Examiner considered that Fig. 2 of Kato et al is said to show electrode 28 having an area larger than twice the size of electrode 24.

Applicants traverse, and respectfully request the Examiner to reconsider in view of the following remarks.

The basis for rejection is that Fig. 2 of Kato et al. is said to show electrode 28 having an area larger than twice the size of electrode 24. However, it is respectfully submitted that such presumption is unwarranted and not supported by the specification of Kato '811.

Particularly, as described at column 9, lines 39-41, Fig. 2 of Kato '811 shows a cross section taken along line A-A of Fig. 1-which says nothing about the subject electrode areas. Namely, the rejection is based an assumption that the widths of electrodes 28 and 24 are the same. However, there is no reason to assume that such is the case. Furthermore, there is nothing in the specification of Kato '811 which describes these electrodes in a manner which would allow for determining their relative areas. Moreover, there is nothing in Kato '811 which describes any advantage of making the area of electrode 28 at least twofold that of electrode 24, and Kato '811 is entirely silent with respect to the relationship between electrode area ratio and element resistance.

In fact, the Examiner is unable to point to any disclosure in Kato '811 or the prior art as to the respective widths and/or areas of electrodes 28 and 24, or to any instruction in the prior art for selecting an electrode width/area for the specific sensor shown in Fig. 2 of Kato '811.

However, in the Office Action dated September 11, 2003, the Examiner continued to maintain that the electrodes in Fig. 2 of Kato '811 cannot extend any significant distance in a width direction such that the ratio of the electrode areas would still be within the claimed range of 2:1 to 5:1.

In response to Applicants' marked up drawing, the Examiner questioned why electrode 28 would be arranged along the axis of the gas flow while electrode 24 would be arranged perpendicularly thereto. The Examiner asserted that one of ordinary skill would understand the electrodes in Kato '811 to be similarly aligned.

Applicants' marked-up drawing shows that because of the narrow width of the diffusion controlling passage 14, electrode 28 would be selected to have a correspondingly narrow width as shown. Conversely, electrode 24 opposing electrode 16 may extend along substantially the entire width of the chamber 10. In this configuration, which is entirely reasonable based on the drawings of Kato '811, is clearly seen that the area of the negative electrode and the area of the positive electrode would not differ by at least two fold as claimed. This is but one example of how the electrodes might be arranged in Kato '811. More importantly, Fig. 2 of Kato '811 is only a cross-sectional view, and therefore does not teach, disclose or suggest in any manner way shape or form the surface area of the electrodes.

That is, there simply is no disclosure or illustration in Kato '811 as to the two-dimensional size of or relative area of electrodes 28 and 24. To the extent that the Examiner continues to apply Kato '811, such reference should be applied for what it discloses rather than speculation. The fact of the matter remains that no information regarding relative electrode area may be determined, one way or the other, from Figs. 1 and 2 of Kato '811.

A copy of the mark-up drawing submitted together with the Preliminary Amendment filed August 21, 2003 is attached hereto for the Examiner's convenience. Also, the Examiner misunderstands that Kato '811 and the present application are commonly assigned. Kato '811 is assigned to NGK Insulators, Ltd., where as the present application is assigned to NGK Spark Plug Co., Ltd. These are entirely two different companies.

Applicants further present herein for the Examiner's consideration new independent claim 37 which recites that electrodes 32a and 34a are sandwiched by solid electrolyte substrates 22 and 24. Claim 37 further distinguishes over Fig. 2 of Kato '811 where electrodes 24 and 28 are disposed within reference gas chamber 10 and second gas chamber 8, respectively (i.e., these electrodes are uncovered and not sandwiched by solid electrolyte layers).

For the above reasons, it is respectfully submitted that the present claims are patentable over Kato '811, and withdrawal of the foregoing rejection under 35 U.S.C. § 102(a) is respectfully requested.

Claims 19, 20 and 31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kato '811. At page 5 of the Office Action, claim 33 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kato '811 in view of U.S. Patent 5,348,630 Yagi et al. Also, claim 36

was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kato '811 in view of U.S. Patent 6,254,750 to Patrick et al.

Applicants rely on the response above with respect to the rejection over Kato '811 alone. Withdrawal of the foregoing rejection is respectfully requested.

Claims 16-20, 22-24 and 30-35 were rejected under 35 U.S.C. § 102(a) as being anticipated by JP 10-38845, corresponding to U.S. Patent 6,036,841. Similar to Kato '811, Figs. 2 and 7 of U.S. '841 were cited as disclosing a sensor including detection electrode 14 and reference electrode 11 formed on the same side of a solid electrolyte substrate 19 and a circuit for applying an electric potential between the respective electrodes. Furthermore, in view of the cross-sectional dimensions, the Examiner considered that the area of electrode 11 is more than twice the area of electrode 14.

The discussion above with respect to Kato '811 also applies to Kato '841. Unlike Kato '811, Kato '841 does not have a Fig. 1 showing a top view of the sensor. Like Kato '811, Kato '841 only shows a cross-sectional view such that no information regarding relative electrode area may be determined from the figures of Kato '841.

As is the case with Kato '811, Kato '841 is also assigned to NGK Insulators, Ltd., which is a company entirely different from NGK Spark Plug Co., Ltd., the assignee of the present application.

Withdrawal of the foregoing rejection is respectfully requested.

Claims 16-18, 20, 22-24, 30 and 33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 10-38845 in view of Kato '811. Claim 33 was rejected under 35 U.S.C. §

103(a) as being unpatentable over JP '845 with or without Kato '811, in view of Yagi et al. Claim 36 was rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '845 in view of Patrick et al.

Applicants reply on the response above with respect to the rejection over JP '845 alone.

Claims 16-20, 22-24 and 30-35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kato '811 or JP '845 in view of JP 61-97754. JP '754 was cited as teaching that one electrode of the cell may have an area different from that of the other electrode in order to reduce the resistance therebetween. The reason for rejection was that it would have been obvious to employ a difference in electrode areas of the second pump cell as taught by JP '754 so as to reduce resistance therebetween.

Applicants respectfully traverse for the following reasons.

As discussed in the Information Disclosure Statement filed August 23, 2003, JP '754 discloses a sensor having a pair of electrodes formed on opposite sides of a solid electrode substrate, and does not disclose a flat limiting-current type sensor.

Applicants further comment on JP '754 as follows.

In JP '754, where the electrodes are formed on opposite sides of the solid electrolyte substrate, preferably each electrode is provided over the entire surface of the solid electrolyte substrate so as to minimize electrical resistance. On the other hand, with regard to a flat limiting-current sensor of Kato '811 and that of the present invention, both electrodes are located on the same side of the solid electrolyte substrate. Thus, it is difficult to provide a flat limiting-current sensor of low resistance which is an object of the present invention. The present

invention is based on the finding that resistance is minimized when the area of the negative electrode and the area of the positive electrode differ by at least two-fold. See, for example, Fig. 6 of the present specification.

An English translation of JP '754, as requested by the Examiner, is attached.

For the above reasons, it is respectfully submitted that one of ordinary skill would not be led to apply JP '754 to either Kato '811 or JP '845, and withdrawal of the foregoing rejection under 35 U.S.C. § 103(a) is respectfully requested.

Claim 33 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kato '811 or JP '845 in view of JP '754 and Yagi et al. Claim 36 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kato '811 or JP '845 in view of JP '745 and Patrick et al.

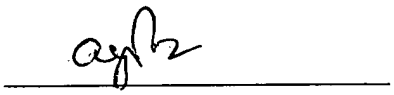
Applicants rely on the response above with respect to the rejection over Kato '811 or JP '845 alone. Withdrawal is respectfully requested.

With respect to page 9 of the Office Action, the undersigned states that U.S. Patent 6,344,134 to Yamada et al and the present application were commonly owned at the time of the invention of the present application. Thus, Yamada '134 is disqualified as prior art under 35 U.S.C. § 103(c).

Withdrawal of all rejections and allowance of claims 16-24 and 30-37 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

Respectfully submitted,



Abraham J. Rosner
Registration No. 33,276

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: March 8, 2004